WHAT IS CLAIMED IS

1. A laser diode, comprising:

a substrate of a first conductivity type;

a first cladding layer having said first conductivity type, said first cladding layer being formed on said substrate epitaxially;

a first optical waveguide layer formed epitaxially on said first cladding layer;

an active layer of a group III-V compound semiconductor material formed epitaxially on said first optical waveguide layer;

a second optical waveguide layer formed epitaxially on said active layer;

a second cladding layer having a second, opposite conductivity type, said second cladding layer being formed on said second optical waveguide layer epitaxially;

a first electrode injecting first type carriers having a first polarity into said active layer; and

a second electrode injecting second type

carriers having a second, opposite polarity into said active layer,

said active layer having a composition of GaInNP containing therein N as a group V element.

2. A laser diode as claimed in claim 1, wherein said laser diode further including, between said first optical waveguide layer and said active layer, an intermediate layer of a group III-V compound semiconductor material substantially free from Al and N in intimate contact with said active layer.

3. A laser diode as claimed in claim 2, wherein said active layer forms a type-I heterojunction with said intermediate layer.

4. A laser diode as claimed in claim 2, wherein said intermediate layer has a composition of GaInP.

5. A laser diode as claimed in claim 2, wherein said intermediate layer has a thickness small enough such that carriers in said active layer have a wavefunction substantially identical with a wavefunction of said carriers for a case where said intermediate layer is not provided.

6. A laser diode as claimed in claim 5, wherein said intermediate layer includes therein a single molecular layer.

7. A laser diode as claimed in claim 2,

wherein said intermediate layer is formed of either of a binary compound or a ternary compound.

8. A laser diode as claimed in claim 2, wherein said intermediate layer has a composition that achieves a lattice matching with said substrate.

9. A laser diode as claimed in claim 2, wherein said intermediate layer has a composition that accumulates a strain therein.

10. A laser diode as claimed in claim 2, wherein said intermediate layer is formed of GaInP.

11. A laser diode as claimed in claim 2, wherein said substrate is formed of GaAs and said intermediate layer is formed of GaP, said intermediate layer having a thickness smaller than a critical thickness above which there occurs a misfit dislocation in said intermediate layer.

12. A laser diode as claimed in claim 2, wherein said substrate is formed of GaP and said intermediate layer has a composition of GaInP.

13. A laser diode as claimed in claim 2, wherein said laser diode further includes, between said active layer and said second optical waveguide layer, another intermediate layer of a group III-V compound semiconductor material substantially free from Al and N in intimate contact with said active layer.

14. A laser diode as claimed in claim 2, wherein said active layer has an MQW structure including an alternate stacking of a plurality of quantum well layers of GaInNP and a plurality of barrier layers, said MQW structure further including, at a bottom surface of each of said quantum well layers, another intermediate layer in intimate contact with said quantum well layer, said another intermediate layer having a composition substantially identical with a composition of said intermediate layer.

15. A laser diode as claimed in claim 14, further including, at a top surface of each of said quantum well layers, a further intermediate layer in intimate contact with said quantum well layer, said further intermediate layer having a composition substantially identical with said composition of said intermediate layer.

16. A laser diode as claimed in claim 3, wherein said active layer accumulates therein a compressive strain.

17. A laser diode as claimed in claim 3, wherein said active layer accumulates therein a tensile strain.

18. A laser diode as claimed in claim 3, wherein said active layer is doped to a p-type.

19. A laser diode as claimed in claim 3, wherein said intermediate layer is doped to an n-type.

20. A laser diode as claimed in claim 2, wherein said intermediate layer includes, at a top surface thereof contacting said active layer, a layer containing N as a group V element.

21. A vertical-cavity laser diode, comprising:

a substrate having a first conductivity type;

a first optical reflector provided on said substrate;

a first cladding layer having said first conductivity type on said first optical reflector in an epitaxial relationship with said substrate;

a first optical waveguide layer formed epitaxially on said first cladding layer;

an active layer of a group III-V compound semiconductor material formed epitaxially on said first cladding layer;

a second optical waveguide layer formed epitaxially on said active layer,

a second cladding layer having a second, opposite conductivity type on said active layer in an epitaxial relationship with said second optical

waveguide layer;

a second optical reflector provided on said second cladding layer;

a first ohmic electrode provided in ohmic contact with said substrate; and

a second ohmic electrode provided in ohmic contact with said second cladding layer;

said active layer having a composition of GaInNP containing therein N as a group V element.

22. A vertical-cavity laser diode as claimed in claim 21, wherein each of said first and second optical reflectors comprises a semiconductor multilayer mirror.

23. An optical disk drive, comprising:

a spindle motor adapted to be mounted with an optical disk, said spindle motor rotating said optical disk mounted thereon; and

an optical pickup focusing an optical beam on

a recording surface of said optical disk mounted on said spindle motor,

said optical pickup including a vertical-cavity laser diode comprising:

a substrate having a first conductivity type;

a first optical reflector provided on said substrate;

a first cladding layer having said first conductivity type on said first optical reflector in an epitaxial relationship with said substrate;

a first optical waveguide layer formed epitaxially on said first cladding layer;

an active layer of a group III-V compound semiconductor material formed epitaxially on said first optical waveguide layer;

a second optical waveguide layer formed epitaxially on said active layer;

a second cladding layer having a second, opposite conductivity type on said second optical waveguide layer in an epitaxial relationship with said active layer;

a second optical reflector provided on said second cladding layer;

a first ohmic electrode provided in ohmic contact with said substrate; and

a second ohmic electrode provided in ohmic contact with said second cladding layer;

said active layer having a composition of GaInNP containing therein N as a group V element.

24. An optical transmission system including an optical transmitter and a plastic optical fiber coupled optically with said optical transmitter, said optical transmitter including a vertical cavity laser diode comprising:

a substrate having a first conductivity type;

a first optical reflector provided on said substrate;

a first cladding layer having said first conductivity type on said first optical reflector in an epitaxial relationship with said substrate;

a first optical waveguide layer formed on said first cladding layer epitaxially;

an active layer of a group III-V compound semiconductor material formed epitaxially on said first optical waveguide layer;

a second optical waveguide layer formed on

said active layer epitaxially;

a second cladding layer having a second, opposite conductivity type on said second optical waveguide layer in an epitaxial relationship with said active layer;

a second optical reflector provided on said second cladding layer;

a first ohmic electrode provided in ohmic contact with said substrate; and

a second ohmic electrode provided in ohmic contact with said second cladding layer;

said active layer having a composition of GaInNP containing therein N as a group V element.

25. A method of fabricating a compound semiconductor device, comprising the step of:

(a) forming a first group III-V compound semiconductor layer epitaxially on a substrate;

(b) exposing a surface of said first group III-V compound semiconductor layer to an atmosphere containing N;

(c) forming, after said step (b), a second

group III-V compound semiconductor layer on said first group III-V compound semiconductor layer epitaxially, said second group III-V compound semiconductor layer containing therein N as a group V element,

wherein said atmosphere is substantially free from a group III element.

26. A method as claimed in claim 25, wherein said atmosphere contains an organic nitrogen compound and a source gas of a group V element other than N.

27. A method as claimed in claim 25, wherein said atmosphere contains DMHy.

28. A method as claimed in claim 27, wherein said step of exposure is conducted at a temperature of

about 600°C.

29. An optical semiconductor device, comprising:

a substrate;

a first layer of a III-V compound semiconductor material formed on said substrate epitaxially, said first layer being substantially free from N;

an active layer of a III-V compound semiconductor material formed on said first layer epitaxially in intimate contact therewith, said active layer containing N as a group V element;

a second layer of a III-V compound semiconductor material formed on said active layer epitaxially in intimate contact therewith, said second layer being substantially free from N,

an interface between said first layer and said active layer contains C.

30. A semiconductor layered structure, comprising:

a first epitaxial layer of AlGaInNP having a composition represented by compositional parameters x1, y1 and z1 ($0 \le x1 < 1$, $0 < y1 \le 1$, $0 < z1 < 1$) as $Al_{x1}Ga_{y1}In_{(1-x1-y1)}N_{z1}P_{(1-z1)}$;

a second epitaxial layer of AlGaInP having a composition represented by compositional parameters x2 and y2 as $Al_{x2}Ga_{y2}In_{(1-x2-y2)}P$, said second epitaxial layer being disposed adjacent to said first epitaxial layer; and

a third epitaxial layer of AlGaInP having a composition represented by compositional parameters x3 and y3 as $Al_{x3}Ga_{y3}In_{(1-x3-y3)}P$, said third epitaxial layer being disposed between said first and second epitaxial layers, said first through third epitaxial layers maintaining an epitaxy with each other;

wherein said compositional parameters are set so as to satisfy the relationship:

$0 \le x3 < x2 \le 1$; $0 < y3 \le 1$.

31. A semiconductor light-emitting device,

comprising:

a substrate of a first conductivity type;

a first cladding layer of AlGaInP of said first conductivity type provided on said substrate;

an active layer of undoped AlGaInNP provided on said cladding layer; and

a second cladding layer of AlGaInP of a second, opposite conductivity type provided on said active layer;

said active layer having a composition represented by compositional parameters x1, y1 and z1 as $Al_{x1}Ga_{y1}In_{(1-x1-y1)}N_{z1}P_{(1-z1)}$ ($0 \le x1 < 1$, $0 < y1 \le 1$, $0 < z1 < 1$), said first cladding layer having a composition represented by compositional parameters x2 and y2 as $Al_{x2}Ga_{y2}In_{(1-x2-y2)}P$,

wherein there is provided an intermediate layer of AlGaInP between said first cladding layer and said active layer, said intermediate layer having a composition represented by compositional parameters x3, y3 and z3 as $Al_{x3}Ga_{y3}In_{(1-x3-y3)}P$,

said compositional parameters satisfying the relationship:

$0 \le x3 < x2 \le 1$; $0 < y3 \le 1$.

32. A semiconductor light-emitting device as claimed in claim 31, wherein said intermediate layer has a composition represented by a compositional parameter y4 as $Ga_{y4}In_{(1-y4)}P$ ($0< y4 < 1$).

33. A semiconductor light-emitting device, comprising:

a substrate of a first conductivity type;

a first cladding layer said first conductivity type provided on said substrate;

a first optical waveguide layer of undoped AlGaInP provided on said first cladding layer;

an active layer of undoped AlGaInNP provided on said optical waveguide layer;

a second optical waveguide layer of undoped AlGaInP provided on said active layer; and

a second cladding layer of a second, opposite conductivity type provided on said second optical waveguide layer

said active layer having a composition represented by compositional parameters x1, y1 and z1 as $Al_{x1}Ga_{y1}In_{(1-x1-y1)}N_{z1}P_{(1-z1)}$ ($0 \le x1 <1$, $0 < y1 \le 1$, 0

< z1 < 1), said first optical waveguide layer having a composition represented by compositional parameters x2 and y2 as $Al_{x2}Ga_{y2}In_{(1-x2-y2)}P$,

wherein there is provided an intermediate layer of AlGaInP between said first optical waveguide layer and said active layer, said intermediate layer having a composition represented by compositional parameters x3 and y3 as $Al_{x3}Ga_{y3}In_{(1-x3-y3)}P$,

said compositional parameters satisfying the relationship:

$0 \leq x3 < x2 \leq 1$; $0 < y3 \leq 1$.

34. A semiconductor light-emitting device as claimed in claim 33, wherein said intermediate layer has a composition represented by a compositional parameter y4 as $Ga_{y4}In_{(1-y4)}P$ ($0 < y4 < 1$).

35. A method of fabricating a semiconductor layered structure comprising a first epitaxial layer of

AlGaInNP having a composition represented by compositional parameters x1, y1 and z1 as $Al_{x1}Ga_{y1}In_{(1-x1-y1)}N_{z1}P_{(1-z1)}$ ($0 \le x1 < 1$, $0 < y1 \le 1$, $0 < z1 < 1$), a second epitaxial layer of AlGaInP having a composition represented by compositional parameters x2 and y2 as $Al_{x2}Ga_{y2}In_{(1-x2-y2)}P$, said second epitaxial layer being disposed adjacent to said first epitaxial layer, and a third epitaxial layer of AlGaInP having a composition represented by compositional parameters x3 and y3 as $Al_{x3}Ga_{y3}In_{(1-x3-y3)}P$, said third epitaxial layer being disposed between said first and second epitaxial layers, said first through third epitaxial layers maintaining an epitaxy with each other, said compositional parameters being set so as to satisfy the relationship $0 \le x3 < x2 \le 1$; $0 < y3 \le 1$,

said method comprising the steps of:

forming said first epitaxial layer by using a metal organic compound of Al for the source of Al;

forming said second epitaxial layer by using a metal organic compound of Al for the source of Al; and

forming said third epitaxial layer by using a metal organic compound of Al for the source of Al.

36. A method as claimed in claim 35, wherein said step of forming said first epitaxial layer is conducted further by using an organic compound of N as the source of N.

37. A method as claimed in claim 36, wherein said organic compound is selected from one of dimethylhydradine and monomethylhydradine.